Susan Walsh, Ph.D.

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Indiana University Indianapolis
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EDUCATION

Doctor of Philosophy (Forensic Genetics) Erasmus
University, Rotterdam, The Netherlands.
<div align="right">**Feb. 2009 – June 2013**</div>

Master of Science (DNA profiling)
University of Central Lancashire, Preston, UK.
<div align="right">**Sept. 2005 – Sept. 2006**</div>

Bachelor of Science (Biochemistry (Hons.))
University College Cork, Cork, Ireland
<div align="right">**Sept. 2001 – June 2005**</div>

ACADEMIC APPOINTMENTS

Adjunct Appointment
Department of Forensic Sciences
University of New Haven, New Haven, CT, USA.
<div align="right">**Aug 2022 – Present**</div>

Adjunct Appointment
Department of Medical and Molecular Genetics
Indiana University School of Medicine, Indianapolis, IN, USA
<div align="right">**Oct 2016 – Present**</div>

Associate Professor
Department of Biology
Indiana University Purdue University Indianapolis, USA
<div align="right">**Aug 2014 – Present**</div>

Graduate Coordinator
Forensic & Investigative Sciences Program
Indiana University Purdue University Indianapolis, USA
<div align="right">**Aug 2015 – July 2017**</div>

Post-Doctoral Research Associate
Department of Anthropology
Yale University, CT, USA.
<div align="right">**June 2013 – July 2014**</div>

Research Assistant
SUPAMAC Analysis Centre
University of Sydney, NSW, Australia.
<div align="right">**June 2007 – Jan. 2009**</div>

RESEARCH FOCUS

Associate Professor (PI)
<div align="right">**August 2014 – Present**</div>

Identification of phenotype: genotype correlations with regards human physical appearance, and its prediction from DNA

Our current work focuses on identifying genes associated with human appearance variation through genome-wide association, with pigmentation and craniofacial morphometrics being the prime traits of interest at present. Our current (ongoing) research database exceeds 5000 individuals with access to multiple collaborator cohorts (Prof. Manfred Kayser – Erasmus MC, Prof. Mark Shriver – Penn State University, Prof. Peter Claes – KU Leuven, Prof. Seth Weinberg – Pittsburgh University) that expand these numbers for replication and meta-analyses. A combination of wet laboratory work with bioinformatics is at the research core of this group.

Forensic & Anthropological Applications

Physical Appearance Prediction from DNA

▪ Through a combination of fundamental research and practical tool development, it is our hope to expand our knowledge on what genes are responsible for global quantitative pigmentation as well as facial morphology variation with a view to designing prediction models/systems that render an image solely using DNA variant information.

Ancestry inference from DNA

▪ The laboratory also conducts research associated with identity and ancestry inference through population-based studies (e.g., Ireland, Lebanon) through the identification of ancestry informative (both autosomal & Y-chromosome) markers.

PEER-REVIEWED PUBLICATIONS

*Corresponding author   G/U = Graduate/Undergraduate Student co-authorship

Research Articles

1. Riman S, **Ghemrawi M**[G], Borsuk LA, Mahfouz R, **Walsh S**, Vallone PM. Sequence-based allelic variations and frequencies for 22 autosomal STR loci in the Lebanese population. ***FSI: Genetics***. **2023**

2. Peng F, Xiong Z, Zhu G, Hysi PG, **Eller RJ**[G], Wu S, Adhikari K, Chen Y, Li Y, Gonzalez-José R, Schüler-Faccini L, Bortolini MC, Acuña-Alonzo V, Canizales-Quinteros S, Gallo C, Poletti G, Bedoya G, Rothhammer F, Uitterlinden AG, Ikram MA, Nijsten T, Ruiz-Linares A, Wang S, **Walsh S**, Spector TD, Martin NG, Kayser M, Liu F. Genome-wide association studies identify DNA variants influencing eyebrow thickness variation in Europeans and across continental populations. ***Investigative Dermatology.*** **2023**

3. Harold S Matthews, Soha Mahdi, Anthony J Penington, Mary L Marazita, John R Shaffer, Susan Walsh, Mark D Shriver, Peter Claes, Seth M Weinberg. Using data-driven phenotyping to investigate the impact of sex on 3D human facial surface morphology. ***Journal of Anatomy.*** **2023**

4. **Wilke F**[G]**, Herrick N**[G], Matthews H, Hoskens H, **Singh S**[U], Shaffer J.R, Weinberg S.M, Shriver M.D, Claes P, **Walsh S**[*]. Exploring Regional Aspects of 3D Facial Variation in a European Population. ***Scientific Reports.*** **2023**

5. Yuan M, Hoskens H, Goovaerts S, **Herrick N**[G], Shriver MD, **Walsh S**, Claes P. Hybrid autoencoder with orthogonal latent space for robust population structure inference. ***Scientific reports.*** **2023**

6. Wang H, Fang S, **Wilke F**[G], Larsson M, **Walsh S**. Human Iris Image Analysis for the Classification of Fuchs' Crypts and Peripupillary Rings. ***Proceedings of SAI Intelligent Systems Conference*** **2022**

7. Naqvi S, Hoskens H, **Wilke F**[G], Weinberg S.M, Shaffer J.R, **Walsh S**, Shriver M.D, Wysocka J, Claes P. Decoding the Human Face: Challenges and Progress in Understanding the Genetics of Craniofacial Morphology. ***Annual Review of Genomics and Human Genetics*** **2022**

8. Liu C, Lee MK, Naqvi S, Hoskens H, Liu D, White JD, Indencleef K, Matthews H, **Eller RJ**[G], Li J, Mohammed J, Swigut T, Richmond D, Manyama M, Hallgrímsson B, Spritz RA, Feingold E, Marazita ML, Wysocka J, **Walsh S**, Shriver MD, Claes P, Weinberg SM, Shaffer JR. Genome scans of facial features in East Africans and cross-population comparisons reveal novel associations. ***PLoS Genetics.*** **2021**

9. Matthews HS, Palmer RL, Baynam GS, Quarrell OW, Klein OD, Spritz RA, Hennekam RC, **Walsh S**, Shriver MD, Weinberg SM, BenHallgrimsson B, Hammond P, Penington AJ, Peeters H, Claes P. Large-scale open-source three-dimensional growth curves for clinical facial assessment and objective description of facial dysmorphism. ***Scientific Reports.*** **2021**

10. Mahdil SS, Nauwelaers N, Joris P, Bouritsas G, Gong S, Bokhnyak S, **Walsh S**, Shriver MD, Bronstein M, Claes P. 3D Facial Matching by Spiral Convolutional Metric Learning and a Biometric Fusion-Net of Demographic Properties. ***IEEE Transactions on Biometrics, Behavior, and Identity Science.*** **2021**

11. Katsara MA, Branicki W, **Walsh S**, Kayser M, Nothnagel M, VISAGE Consortium. Evaluation of supervised machine-learning methods for predicting appearance traits from DNA. ***Forensic Sci. Int. Genet.*** **2021**

12. Naqvi S, Sleyp Y, Hoskens H, Indencleef K, Spence JP, Bruffaerts R, Radwan A, **Eller RJ**[G], Richmond S, Shriver MD, Shaffer JR, Weinberg SM, **Walsh S**, Thompson J, Pritchard JK, Sunaert S, Peeters H, Wysocka J, Claes P. Shared heritability of human face and brain shape. ***Nature Genetics.*** **2021**

13. Hoskens H, Liu L, Naqvi S, Lee MK, **Eller RJ^G**, Indencleef K, White JD, Li J, Larmuseau MHD, Hens G, Wysocka J, **Walsh S**, Richmond S, Shriver MD, Shaffer JR, Peeters H, Weinberg SM, Claes P. 3D facial phenotyping by biometric sibling matching used in contemporary genomic methodologies. *PLoS genetics.* **2021**

14. Ekrami O, Claes P, Shriver M.D, Weinberg S.M, Marazita M.L, **Walsh S**, Van Dongen S. Effects of Male Facial Masculinity on Perceived Attractiveness. *Adaptive Human Behavior and Physiology*. **2021**

15. Indencleef K, Hoskens H, Lee MK, White JD, Liu C, **Eller RJ^G**, Naqvi S, Wehby GL, Moreno Uribe LM, Hecht JT, Long Jr RE, Christensen K, Deleyiannis FW, **Walsh S**, Shriver MD, Richmond S, Wysocka J, Peeters H, Shaffer JR, Marazita ML, Hens G, Weinberg SM, Claes P. The intersection of the genetic architectures of orofacial clefts and normal facial variation. *Frontiers in genetics*. **2021**

16. Ekrami O, Claes P, Van Assche E, Shriver MD, Weinberg SM, Marazita ML, **Walsh S**, Van Dongen S. Fluctuating Asymmetry and Sexual Dimorphism in Human Facial Morphology: A Multi-Variate Study. *Symmetry*. **2021**

17. White J.D, Indencleef K, Naqvi S, **Eller R.J^G** , Hoskens H, Roosenboom J, Lee M.K, Li J, Mohammed J, Richmond S, Quillen E.E, Norton H.L, Feingold E, Swigut T, Marazita M.L, Peeters H, Hens G, Shaffer J.R, Wysocka J, **Walsh S,** Weinberg S.M, Shriver M.D & Claes P. Insights into the genetic architecture of the human face. *Nature Genetics.* **2020**

18. Katsara M.A, Branicki W, Pośpiech E, Hysi P, **Walsh S**, Kayser M, Nothnagel M, VISAGE Consortium. Testing the impact of trait prevalence priors in Bayesian-based genetic prediction modeling of human appearance traits *Forensic Sci. Int. Genet.* **2020**

19. Chen Y, Branicki W, **Walsh S,** Nothnagel M, Kayser M, Liu F, VISAGE Consortium. The impact of correlations between pigmentation phenotypes and underlying genotypes on genetic prediction of pigmentation traits. *Forensic Sci Int. Genet.* **2020**

20. Li J, González Zarzar T, White J.D, Indencleef K, Hoskens H, Matthews H, Nauwelaers N, Zaidi A, **Eller R.J^G**, **Herrick N^G**, Günther T, Svensson E.M, Jakobsson M, **Walsh S**, Van Steen K, Shriver M.D, Claes P. Robust genome-wide ancestry inference for heterogeneous datasets: illustrated using the 1,000 genome project with 3D facial images. *Scientific Reports.* **2020**

21. Ekrami O, Claes P, White J. D, Weinberg S.M, Marazita M.L, **Walsh S**, Shriver M.D and Dongen S.V. A Multivariate Approach to Determine the Dimensionality of Human Facial Asymmetry. *Symmetry*. **2020**

22. Wang J, Fang S, Fang M, Wilson J, Herrick NG, **Walsh S**. Automatic Landmark Placement for Large 3D Facial Image Dataset. In *Proceedings of the IEEE International Conference on Big Data*, Los Angeles, CA, USA, 9-13 December 2019; pp. 5088-5093. **2019**

23. **Breslin K^G, Wills B^G**, Ralf A, Ventayol Garcia M, Kukla-Bartosze M, Pośpiech E, Freire-Aradas A, Xavier C, Ingold S, de La Puente M, van der Gaag K.J, Herrick NG, Haas C, Parson W, Phillips C, Sijen T, Branicki W, **Walsh S*,** Manfred Kayser*. HIrisPlex-S system for eye, hair, and skin color prediction from DNA: massively parallel sequencing solutions for two common forensically used platforms. *Forensic Sci. Int. Genet.* **2019**

24. Daniels-Higginbotham J, Gorden E.M, **Farmer S.K^G** , Spatola B, Damann F, Bellantoni N, Gagnon K.S, de la Puente M, Xavier C, **Walsh S** , Parson W, McMahon T.P, Marshall C DNA testing reveals the putative identity of JB55, a 19th century vampire buried in Griswold, Connecticut. *Genes*. **2019**

25. **Eller R.J^G*,** Janga S.C and **Walsh S**. Odyssey: a semi-automated pipeline for phasing, imputation, and analysis of genome-wide genetic data. *BMC Bioinformatics.* **2019**

26. Brace S, Diekmann Y, Booth T, van Dorp L, Faltyskova Z, Rohland N, Mallick S, Olalde I, Ferry M, Michel M, Oppenheimer J, Broomandkhoshbacht N, Stewardson K, Martiniano R, **Walsh S**, Kayser M, Charlton S, Hellenthal G, Armit I, Schulting R, Craig O, Sheridan A, Parker Pearson M, Stringer C, Reich D, Thomas M, and Barnes I. Ancient Genomes Indicate Population Replacement in Early Neolithic Britain. *Nature Ecology & Evolution.* **2019**

27. Peng F, Zhu G, Hysi P.G, Eller R.JG, Chen Y, Li Y, Hamer M.A, Zeng C, Hopkins R.LG, Jacobus C.JG, Wallace P.LU, Uitterlinden A.G, Ikram M.A, Nijsten T, Duffy D.L, Medland S.E, Spector T.D, **Walsh S**, Martin N.G, Liu F, Kayser M. Genome-wide association studies identify multiple genetic loci influencing eyebrow color variation**.** *Investigative Dermatology.* **2019**

28. Pośpiech E, Chen Y, Kukla-Bartoszek M, **Breslin K^G**, Aliferi A, Andersen J.D, Ballard D, Chaitanya L, Freire-Aradas A, van der Gaag K.J, Girón-Santamaría L, Gross T.E, Gysi M, Huber G, Mosquera- Miguel A, **Muralidharan C^G**, Skowron M, Carracedo Á, Haas C, Morling N, Parson W, Phillips C, Schneider P.M, Sijen T, Syndercombe-Court D, Vennemann M, Wu S, Xu S, Jin L, Wang S, Zhu G, Martin N.G, Medland S.E, Branicki W, **Walsh S**, Liu F, Kayser M, EUROFORGEN **2018**

NoE Consortium. Towards broadening Forensic DNA Phenotyping beyond pigmentation: Improving the prediction of head hair shape from DNA. *Forensic Sci. Int. Genet.*

29. Kukla-Bartoszek M, Pośpiech E, Spólnicka M, Karłowska-Pik J, Strapagiel D, Żądzińska E, Rosset I, Sobalska- Kwapis M, Słomka M, **Walsh S**, Kayser M, Sitek A, Branicki W. Investigating the impact of age-depended hair colour darkening during childhood on DNA-based hair colour prediction with the HIrisPlex system. *Forensic Sci. Int. Genet.* **2018**

30. Chaitanya L, **Breslin K^G**, Zuñiga S, Wirken L, Pospiech E, Kukla-Bartoszek M, Sijen T, de Knijff P, Liu F, Branicki W, Kayser M*, **Walsh S*.** The HIrisPlex-S system for eye, hair and skin colour prediction from DNA: Introduction and forensic developmental validation. *Forensic Sci. Int. Genet.* **2018**

31. Liu F, Chen Y, Zhu G, Hysi P, Wu S, Adhikari K, **Breslin K^G**, Pośpiech E, Hamer MA, Peng F, **Muralidharan C^G**, Acuna-Alonzo V, Canizales-Quinteros S, Bedoya G, Gallo C, Poletti G, Rothhammer F, Bortolini MC, Gonzalez-Jose R, Zeng C, Xu S, Jin L, Uitterlinden AG, Ikram MA, van Duijn CM, Nijsten T, **Walsh S**, Branicki W, Wang S, Ruiz-Linares A, Spector T, Martin N, Medland S, Kayser K. Meta-analysis of genome-wide association studies identifies 8 novel loci involved in shape variation of human head hair. *Human Molecular Genetics.* **2018**

32. **Walsh S*,** Chaitanya L, Breslin KG, Muralidharan CG, Bronikowska A, Pospiech E, Koller J, Kovatsi L, Wollstein A, Branicki W, Liu F and Kayser M*. Global skin color prediction from DNA. *Human Genetics.* **2017**

33. Wollstein A, **Walsh S**, Liu F, Chakravarthy U, Rahu M, Seland H, Soubrane G, Tomazzoli L et al. Novel quantitative pigmentation phenotyping enhances genetic association, epistasis, and prediction of human eye colour. *Scientific Reports.* **2017**

34. Caliebe A, **Walsh S**, Liu F, Sjerps M, Kayser M, Krawczak M. Likelihood ratio and posterior odds in forensic genetics: Two sides to the same coin. *Forensic Sci. Int. Genet.* **2017**

35. Haeusler M, Haas C, Seiler R, Lösch S, Moghaddam N, **Walsh S**, Kayser M, Rühli F, Janosa M, Papageorgopoulou C. Multidisciplinary identification of the controversial freedom fighter Jörg Jenatsch, assassinated 1639 in Chur Switzerland. *Plos One.* **2016**

36. Chaitanya L, Pajnič IZ, **Walsh S**, Balažic J, Zupanc T, Kayser M. Bringing colour back after 70 years: Predicting eye and hair colour from skeletal remains of World War II victims using the HIrisPlex system. *Forensic Sci. Int. Genet.* **2016**

37. Liu F, Visser M, Duffy D.L, Hysi P.G, Jacobs L.C, Lao O, Zhong K, **Walsh S**, Chaitanya L et al. Genetics of skin color variation in Europeans: genome-wide association studies with functional follow-up. *Human Genetics.* **2015**

38. King T.E, Fortes G.G, Balaresque P, Thomas M.G, Balding D, Delser P.M, Neumann R, Parson W, Knapp M, **Walsh S**, Tonasso L, Holt J, Kayser M, Appleby J, Forster P, Ekserdjian D, Hofreiter M, Schü¨rer K. Identification of the remains of King Richard III. *Nature Communications.* **2014**

39. Chaitanya L#, **Walsh S#**, et al. Collaborative EDNAP exercise on the IrisPlex system for DNA-based prediction of human eye colour. *Forensic Sci. Int. Genet.* # equal contributors **2014**

40. Pośpiech E, Wojas-Pelc A, **Walsh S**, Liu F, Maeda H, Ishikawa T, Skowron M, Kayser M, Branicki W, The common occurrence of epistasis in the determination of human pigmentation and its impact on DNA - based pigmentation phenotype prediction. *Forensic Sci. Int. Genet.* **2014**

41. **Walsh S**, Chaitanya L, Clarisse L, Wirken L, Draus-Barini J, Kovatsi L, Maeda H, Ishikawa T, Sijen T, de Knijff P, Branicki W, Liu F, Kayser M, Developmental Validation of the HIrisPlex system: DNA- based eye and hair colour prediction for forensic and anthropological usage. *Forensic Sci. Int. Genet.* **2014**

42. Liu F, **Walsh S**, Kayser M, Of sex and IrisPlex eye colour prediction: A reply to Martinez-Cadenas et al. *Forensic Sci. Int. Genet.* **2014**

43. Keating B, Bansal A.T, **Walsh S**, Millman J, Newman J, Kidd K, Budowle B, Eisenberg A, Donfack J, Gasparini P, Budimlija Z, Henders A.K, Chandrupatla H, Duffy D.L, Gordon S.D, Hysi P, Liu F, Medland S.E, Rubin L, Martin N.G, Spector T.D, Kayser M, on behalf of the International Visible Trait Genetics (VisiGen) Consortium, First All-in-One Tool for DNA Forensics: Parallel Genome-wide Inference of Bio-Geographic Ancestry, Appearance, Relatedness and Gender With Identitas Forensic Chip. *Int. J. Legal Med.* **2014**

44. Draus-Barini J, **Walsh S**, Pośpiech E, Kupiec T, Głąb H, Branicki W, Kayser M, Bona fide colour: DNA prediction of human eye and hair colour from ancient and contemporary skeletal remains. *Investigative Genetics.* **2013**

45. **Walsh S**, Liu F, Wollstein A, Kovatsi L, Ralf A, Kosiniak-Kamysz A, Branicki W, Kayser M, The HIrisPlex system for simultaneous prediction of hair and eye colour from DNA. *Forensic Sci. Int. Genet.* **2013**

46. Pingen M, Nouwen J.L, Dinant S, Albert J, Mild M, Brodin J, Simen B.B, Walsh S, Kayser M, van der Ende M.E, Schutten M, Boucher C.A.B. Therapy failure resulting from superinfection by a drug r esistant HIV variant. *Antiviral Therapy.* **2013**

47. Topouzis F, Vingerling J.R., Vioque J, Fletcher A.E., Ballantyne K.N., Kayser M. DNA-based eye colour prediction across Europe with the IrisPlex system. *Forensic Sci. Int. Genet.* **2012**

48. Branicki W, Liu F, van Duijn K, Draus-Barini J, Pospiech E, **Walsh S**, Kupiec T, Wojas-Pelc A, Kayser M. Model-based prediction of human hair color using DNA variants. *Human Genetics.* **2012**

49. **Walsh S**, Lindenbergh A, Zuniga S.B, Sijen T, de Knijff P, Kayser M, Ballantyne K.N. Developmental validation of the IrisPlex system: Determination of blue and brown iris colour for forensic intelligence. *Forensic Sci. Int. Genet* **2011**

50. Liu F, Wollstein A, Hysi P.G, Ankra-Badu G.A, Spector T.D, Park D, Zhu G, Larsson M, Duffy D.L, Montgomery G.W, Mackey D.A, **Walsh S**, Lao O, Hofman A, Rivadeneira F, Vingerling J.R, Uitterlinden A.G, Martin N.G, Hammond C.J, Kayser M. Digital quantification of human eye color highlights genetic association of three new loci. *PLoS Genetics.* **2011**

51. **Walsh S**, Liu F, Ballantyne K.N, van Oven M, Lao O, Kayser M. IrisPlex: A sensitive DNA tool for accurate prediction of blue and brown eye colour in the absence of ancestry information. *Forensic Sci. Int. Genet.* **2011**

Invited Book Chapters

1. **Walsh S**, Kayser M. Prediction of Physical Characteristics, such as Eye, Hair, and Skin Color Based Solely on DNA from Forensic DNA Application: Interdisciplinary Prospective (2nd edition). Chapter 17 pp 357. CRC Press. **2023**

2. **Walsh S**, Kayser M. A Practical Guide to the HIrisPlex System: Simultaneous Prediction of Eye and Hair Color from DNA in Forensic DNA Profiling Protocols (2nd edition) pp 213 -231. Springer NY. **2016**

3. **Walsh S**, Kayser M. Predicting Human Appearance from DNA in forensic investigations in Handbook of Forensic Genetics: Biodiversity and Heredity in Civil and Criminal Investigation (vol2). Imperial College Press. **2016**

Invited Commentary

1. **Walsh S**, Pośpiech E, Branicki W. Commentary: Hot on the Trail of Genes that Shape Our Fingerprints. Investigative Dermatology. **2016**

RESEARCH FUNDING

Current Support

Research and Development in Forensic Science Grant (15PNIJ-23-GG-04206-RESS) 01/01/24 to 12/31/26
National Institute of Justice (NIJ) (3-year grant)
Title: Quantitative and visual prediction of eye, hair and skin color from DNA
Role: PI   Co-I: Manfred Kayser (Erasmus MC, NL)
Total Funding Amount: $980,527

NIH Research Enhancement Award (AREA R15) Grant (R15DE031929) 08/01/22 to 7/31/25
National Institute of Dental and Craniofacial Research (NIDCR)
Title: Investigating the genetic basis of human skeletal facial morphology
Role: PI
Total Funding Amount: $468,255

Research Project Grant Program (R01) 04/01/20 to 03/31/25
National Institute of Health (NIH) (5-year grant)
Title: The Genetic Architecture of Human Facial Morphology
Role: Co-I   PD/PI: Seth Weinberg (Pittsburgh University)
Total Funding Amount: $379,315

Completed Support

Research and Development in Forensic Science Grant (2018-DU-BX-0219)   01/01/19 to 12/31/22
National Institute of Justice (NIJ) (3-year grant, 1-year NCE)
Title: Ensuring standards and enhancing the field of predictive biometrics using a globally diverse
genotype-phenotype database
Role: PI   Co-I: Mark Shriver (PSU)
Total Funding Amount: $651,242

Graduate Research Fellowship STEM Award (2015-R2-CX-0023)   01/01/16 to 12/31/18
National Institute of Justice (NIJ) Graduate Student Fellowship with 3-year support
Title: An Investigation into the genetic basis of human facial morphology and its prediction from DNA,
using a globally distributed panel of individuals from the US and Europe.
Role: Co-PI/Advisor   PI: Ryan Eller (PhD student)
Total Funding Amount: $113,364

Research and Development in Forensic Science Grant (2014-DN-BX-K031)   01/01/15 to 06/30/18
National Institute of Justice (NIJ) (3-year grant including 6-month NCE)
Title: Improving the prediction of human quantitative pigmentation traits such as eye, hair, and skin
color using a worldwide representation panel of US, and European individuals
Role: PI
Total Funding Amount: $1,123,404

Defense University Research Instrumentation Program (DURIP) (66843-LS-RIP)   2015-2016
Department of Defense (DOD) equipment grant
Title: Improving knowledge on the genetic basis of human physical appearance for human identification through
next generation sequencing technologies
Role: PI
Total Funding Amount: $146,450

Research Support Funds Grant (RSFG)   01/01/18 to 12/31/19
IUPUI internal grant OVCR (2-year grant)
Title: Collection of human skeletal facial soft tissue thickness to assist phenotype prediction for forensic
and anthropological applications
Role: PI
Total Funding Amount: $34,812

Pending Support

HONORS/AWARDS

April 2022: IUPUI School of Science Trustees Teaching Award

April 2020: IUPUI School of Science Research Award (Tenure-Track)

September 2013: Best Oral Presentation award at the International Society for Forensic Genetics (ISFG) Conference,
Melbourne, Australia. Title: Predicting skin colour from DNA using a model-based approach.

ABSTRACTS AND PRESENTATIONS

INVITED SPEAKER/WORKSHOP

Feb 2023:   Invited panel on Forensic DNA Phenotyping at the Canadian Legal Counsel conference. Toronto, Canada. Virtual.

Sept 2022:   Invited workshop on Forensic DNA Phenotyping at the International Society for Forensic Genetics (ISFG) conference. Washington DC., USA

July 2022:   Facial Appearance Prediction: Will it be possible one day? Green Mountain Conference. Burlington, VT, USA.

June 2022:   Let's face it, we've got a lot to learn. Forensic Analysis of Human DNA Gordon Research Conference. West Dover, VT, USA.

Jan 2022: Understanding the human face. IUPUI Forensic Graduate Seminar Series. IUPUI, IN, USA.

Dec 2020: The continuous nature of iris color, from gene discovery to its prediction from DNA. National Institute of Science & Technology (NIST). Virtual.

Oct 2020: Building quantitative prediction models for eye color. IUPUI Forensic Graduate Seminar Series. Virtual.

Sept 2020: Quantitative prediction of eye color from DNA. International Symposium on Human Identification (ISHI) conference. Virtual.

Sept 2020: Hands-on usage of the HIrisPlex-S pipeline for pigmentation prediction. Invited workshop at the Mid-Western Association of Forensic Scientists (MAFS). Virtual.

Oct 2019: Physical Appearance Prediction from DNA. Department of Biomedical Engineering Graduate SeminarSeries, IUPUI, IN, USA.

Sept 2019: Panel Discussion Member: The Future of Forensics. International Symposium on Human Identification,Palm Springs, CA, USA.

July 2019: Eye see you! hunting for genes associated with iris color and structure. Department of Ophthalmology, IU School of Medicine, IN, USA.

March 2019: The prediction of human physical appearance from DNA. Wabash College, IN, USA.

Feb 2019: The prediction of human physical appearance from DNA. IU Winter College, Naples, FL, USA.

Nov 2018: The modeling of human physical appearance prediction from DNA. School of Informatics, Computing, and Engineering (SICE) Seminar Series, Indiana University, Bloomington, IN, USA.

Nov 2018: Research overview presentation on human physical appearance prediction from DNA. Department of Biology Seminar Series, IUPUI, Indianapolis, IN, USA.

Nov 2018: Human physical appearance prediction from DNA. Department of Anthropology Seminar Series, University of Chicago-Urbana Champaign, IL, USA.

Sept 2018: Invited workshop on Forensic DNA Phenotyping at the Midwestern Association of Forensic Scientists (MAFS) Conference. Indianapolis, IN, USA.

June 2018: Discussion Leader for the Gordon Research Conference (GRC) on Forensic Analysis of Human DNA: Age, Appearance and Ancestry. Sunday River, Maine, USA.

Oct 2017: Webinar: Predict Human Appearance From DNA, Focusing On Pigmentation for NIJ's Forensic Technology Center of Excellence. Virtual.

Sept 2017: Invited workshop on Forensic DNA Phenotyping at the International Society for Forensic Genetics(ISFG) Conference, Seoul, South Korea. (provided workshop materials and website)

April 2017: AAPA pigment symposium. Evolutionary responses to solar radiation: eye, hair and skin color prediction, New Orleans, LA, USA.

Feb 2017: Research progress on quantitative pigment prediction, NIJ research symposium, New Orleans, LA.

Oct 2016: Invited seminar for the Medical and Molecular Genetics CME Seminar Series on Forensic DNA phenotyping, Indiana University School of Medicine, Indianapolis, IN, USA.

Oct 2016: Invited talk at the Indiana Medical History Museum talk on Forensic DNA phenotyping, Indianapolis, IN, USA.

Sept 2016: Invited to give a workshop on Forensic DNA Phenotyping at the International Symposium on Human Identification (ISHI) Conference, Minneapolis, Minnesota, USA.

June 2016: Predictive biometrics and the human face. Gordon Research Conference (GRC) on Forensic Analysis of Human DNA, Waterville Valley, NH, USA.

Jan 2016: Science on Tap: Finding the right genes: are you a biological witness? School of Science at IUPUI, Indianapolis, IN, USA.

Sept 2015: Invited to conduct a workshop on Forensic DNA Phenotyping at the International Society for Forensic Genetics (ISFG) Conference, Krakow, Poland.

Nov 2013: Yale Biological Anthropology Colloquium Series. The prediction of humanphysical appearance (pigmentation) from DNA. New Haven, CT, USA.

Sept2013: Invited to conduct a workshop on Forensic DNA Phenotyping at the International Society for Forensic Genetics (ISFG) Conference, Melbourne, Australia.

May 2012: Qiagen Investigator Meeting, Hilden, Germany. HIrisPlex eye and hair colour prediction tool.

April 2012: Invited to give an undergraduate lecture (final year Biochemistry students) on human physical appearance/trait prediction at UCC, Cork, Ireland.

Oct 2011: Visiting researcher, The Office of Chief Medical Examiner (OCME). Current forensic phenotyping work: from IrisPlex to HIrisPlex. NYC, USA.

Oct 2011: Invited to conduct a workshop on Forensic DNA Phenotyping at the International Symposium on Human Identification (ISHI) Conference, National Harbor, MD, USA.

Feb 2011: NFI (Nederlands Forensisch Instituut). DNA-based eye colour prediction across Europe with the IrisPlex system. Den Haag, The Netherlands.

PRESENTATIONS/CONFERENCE TALKS

Sept 2022: International Society for Forensic Genetics (ISFG) conference. Washington DC., USA. Whats in a face? Exploring Regional Aspects of 3D Facial Variation in a European Population. (Student oral presentation).

July 2021: The International Association For Craniofacial Identification (IACI) (Virtual). Visualizing Genetic Ancestry on the Human Face in a European Cohort. (Student oral presentation).

Sept 2019: International society of forensic genetics (ISFG) Conference, Prague, Czech Republic. Approaches to explain and potentially predict the complex architecture of the human face.

Feb 2019: American Association of Forensic Scientists (AAFS) Conference, Baltimore, MD. Eye, Hair, and Skin Color Prediction using the HIrisPlex-S (HPS) System and Massive Parallel Sequencing (MPS). (Student oral presentation).

May 2018: Haploid Markers 2018 Conference, Bydgoszcz, Poland. Examining Viking Ancestry in Irish surnames. (Student oral presentation).

April 2018: Emirates International Forensic Conference and Exhibition, Dubai, United Arab Emirates. Eye, hair and skin pigmentation prediction of a Lebanese Population. (Student oral presentation).

Sept 2015: International Society for Forensic Genetics (ISFG) Conference, Krakow, Poland. The HIrisPlex-Ssystem: Combined DNA prediction of eye, hair & skin colour.

Sept 2013:	International Society for Forensic Genetics (ISFG) Conference, Melbourne, Australia. The prediction of human skin colour using a model-based approach.
Oct 2012:	International Symposium on Human Identification (ISHI) Conference, Nashville, TN, USA. HirisPlex:DNA test system for Eye and Hair Colour Prediction.
Aug 2012:	European Academy of Forensic Science (EAFS) Conference, Den Haag, The Netherlands. HIrisPlex: DNA test system for Eye and Hair Colour Prediction.
Jan 2012:	NFI Symposium, Den Haag, The Netherlands. IrisPlex and HIrisPlex systems.
Aug 2011:	International Society for Forensic Genetics (ISFG) Conference, Vienna, Austria. The HIrisPlex system: simultaneous prediction of both hair and eye colour from DNA.

POSTER PRESENTATIONS

June 2023:	Co-Landmarking Hard and Soft Tissue Facial Structures using Dense Correspondence Masks. FaceBase 2023 Community Forum. Los Angeles, CA., USA. Virtual. (Student presentation).
May 2023:	Face-ing the future: Are we ready? NIJ National Research Conference, Arlington, VA., USA. (Student presentation).
Sept 2022:	Enhancing biogeographic ancestry inference of the MENA region with deep learning visualization approaches. International Society for Forensic Genetics (ISFG) conference. Washington DC., USA. (Student presentation).
June 2021:	Facial Phenotyping: Where to begin. Forensic Analysis of Human DNA Gordon Research Conference. West Dover, VT. (Student presentation)
June 2019:	Automation in a Genome Wide Association Study of Categorical Mandible Shape. Facial Genetics Symposium, Pittsburgh, PA. (Student presentation).
June 2019:	2D, 3D, and CBCT facial imagery: Connecting the dots between imaging techniques. Facial Genetics Symposium, Pittsburgh, PA. (Student presentation).
Oct 2018:	The search for quantitative iris pigmentation markers using automation in genome-wide association studies: from phenotype to genotype. American Society of Human Genetics (ASHG), San Diego, CA. (Student presentation)
Oct 2018:	Tissue transcriptomics: potential for postmortem interval predictions. American Society of Human Genetics (ASHG), San Diego, CA. (Student presentation)
March 2018:	Unearthing New Variants Related to Common Variation in Human Facial Morphology Using Genome Wide Association Study (GWAS) Methods. PITTCON conference and expo, Orlando, Florida. (Student presentation)
Sept 2016:	Measuring Epistatic interactions between known DNA variants for eye and hair color to improve statistical prediction models. International Symposium on Human Identification (ISHI) Conference, Minneapolis, Minnesota. (Student presentation)
Sept 2016:	Forensic DNA Phenotyping through Massive Parallel Sequencing. International Symposium on Human Identification (ISHI) Conference, Minneapolis, Minnesota. (Student presentation)
Sept 2016:	A Quantitative Approach to Measuring Eye Pigmentation for Genome Wide Association Studies. International Symposium on Human Identification (ISHI) Conference, Minneapolis, Minnesota. (Student presentation)

July 2016:	Novel quantitative pigmentation phenotyping enhances genetic association, epistasis, and prediction of human eye colour. Waterville Valley, NH. GRC conference.
Oct 2015:	HIrisPlex-S – eye, hair and skin color prediction from DNA. International Symposium on Human Identification (ISHI) Conference, Grapevine, Texas. (Student presentation)
Sept 2013:	Developmental validation of the HirisPlex system: DNA-based eye and hair colour prediction for forensic and anthropological usage. International Society for Human Genetics (ISFG) Conference, Melbourne, Australia.
June 2010:	IrisPlex: A sensitive DNA tool for accurate prediction of blue and brown eye colour in the absence of ancestry information. 17 MGC PhD student workshop, Cologne, Germany.

TEACHING EXPERIENCE

Indiana University Purdue University Indianapolis

Population Genetics, Undergraduate FIS43000 (Lecture).	Spring 2015 to present.
Population Genetics, Graduate FIS53000 (Lecture).	Spring 2015 to present.
Forensic Genetics, Undergraduate FIS40300 (Lecture).	Spring 2016 to 2018 inclusive.
Forensic Genetics, Undergraduate Laboratory FIS40301.	Spring 2016 to 2019 inclusive.

University of New Haven

Forensic DNA Phenotyping: Appearance & Ancestry, Graduate FORS6604 (Online).	Fall II 2022 to present.

MENTORING EXPERIENCE

Walsh Laboratory

Graduate Students

- Franziska Wilke (2020-present) - Biology PhD Candidate
- Robert Hart (2023-present) - Biology PhD Candidate
- Nichole Dopkins (2023-present) - Forensic MS Candidate

Graduated MS Students

- Clarissa Wallpe (Hartman) (2019-2021)

  Understanding the relationship between *HERC2* and *OCA2* variants and iris pigmentation genetics

- Racquel Hopkins (2018-2020)

  Quantitatively assessing the genetics of hair color in addition to identifying Regulatory Elements impacting Body - Mass Index in the FTO Gene

- Bailey Wills (2017-2019)

  Optimization of markers sets and tools for phenotype, ancestry and identity using genetics & proteomics

- Stephanie Farmer (2016-2018)

  An Exploration of Irish surname history through patrilineal genetics

- Mirna Ghemrawi (2016-2018)

  Investigation into the Lebanese genome: ancestry markers, autosomal strs, Y-DNA, and phenotype prediction

- Krystal Breslin (2015-2017)

  Forensic DNA Phenotyping & Massive Parallel Sequencing

- Wesli Kay Stubbs (2015-2017)

Forensic applications of associating human scalp hair morphology and pigmentation analysis at the microscopic and molecular level

- Charanya Muralidharan (2015-2017)

  Elucidating the mechanisms/interactions involved in differing hair color follicles

Graduated PhD Students

- Noah Herrick (2017-2023)

  Exploring the effects of ancestry on inference and identity using bioinformatics

- Ryan Eller (2015-2019)

  Enhancing genetic knowledge of human iris pigmentation and facial morphology.

SERVICE CONTRIBUTIONS

- **Grant Ad-hoc Reviewer**

  National Science Foundation (NSF), USA - Biological Anthropology, Law & Science

  Medical Research Council, United Kingdom

  National Science Council, Poland

  Swiss National Science Foundation, Switzerland

- **Journal Ad-hoc Reviewer**
  - Nature Communications ♦ Nature Genetics ♦ Forensic Science International: Genetics ♦ Human Biology
  - Scientific Reports ♦ Science & Justice ♦ Royal Society Open Science ♦ Annals of Human Genetics
  - Electrophoresis ♦ Journal of Computational Biology ♦ Journal of Forensic Science

PROFESSIONAL MEMBERSHIPS

- International Society for Forensic Genetics (ISFG)